

MeritCare Health System

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Aunt Cathy's Guide to:

New Discoveries about Folic Acid and Health

Remember that episode on the old "I Love Lucy" show when Lucy and Ethel were working on an assembly line packaging chocolates? When they couldn't keep up the pace, the chocolates ended up everywhere and the whole system broke down.

Something similar happens in our bodies when workers on assembly lines in our cells are missing the tools they need to work efficiently. One critical tool is "folic acid" -- a B vitamin that must be available when converting one bunch of stuff to another. **When folic acid is inadequate, a sort of half-baked product starts to pile up and clog the works.** This half-baked stuff is "**homocysteine**", and it causes serious damage to blood vessels, increasing risk of stroke, heart disease, Alzheimer's disease and other problems

A high homocysteine level is so dangerous that some experts estimate that reducing the level to normal cuts risk of stroke as much as quitting smoking! The great news is that normalizing homocysteine levels is often as easy as taking a standard multivitamin with 400 mcg of folic acid in it daily. That's a very simple and inexpensive way to make a very big difference in risk! It appears that men may need more folic acid than women to achieve the same benefit.

What about folic acid in foods? Many foods contain no folic acid, and of those that do, much is in a form that we don't digest and absorb well. The term "folate" is a family name for many forms of folic acid in foods (from the Latin word for "foliage"). It was thought that all food sources of folate contributed useable folic acid, but new research shows that many are poorly used by the body. Until we learn which foods have the useable form, the safest thing is to take a daily vitamin supplement, since these contain the useable "folic acid" form. As advised in the New England Journal of Medicine (4/9/98): **Eat all those fruits and vegetables and legumes for many important health reasons . . . and take a vitamin supplement!**

In 1998 folic acid in a well-absorbed form was added to grain products in America, so fewer people should be found to have high homocysteine levels now. However, there is concern among some experts that the amount one might obtain from a typical intake of fortified grains along with a "good diet" is still insufficient for many people. Many American children had been found to have high homocysteine levels (and therefore higher risk of heart disease, etc.) when it was tested just before the grain

fortification began. A study this year shows that overweight insulin-resistant children also have higher homocysteine levels and that their folic acid adequacy requires attention.

Other benefits from assuring folic acid adequacy: In this small space I can only share a tiny taste of all the exciting new discoveries about folic acid. If the following situations apply to you, please share this article with your health care provider, and I will be happy to provide him/her with the details from the medical journals. **Much can be gained just by taking a multivitamin daily, but sometimes a different level is needed because of a medical condition, use of certain medications, or because of genetic differences:**

Several genetic patterns have been identified that increase folic acid requirements. People of Irish/Scots/English ancestry are at higher risk, as are families with a history of depression, Alzheimer's disease, heart disease, stroke, colon cancer, schizophrenia and birth defects. In fact, the first recognition of the importance of obtaining folic acid prior to conception and throughout pregnancy was made in the British Isles. The problems of spina bifida and anencephaly (two very serious birth defects of the brain/spinal cord -- the "neural tube") were much more common among people of that region, and the risk remained high even if they moved to other parts of the world. Other groups at higher risk of high homocysteine levels are now being identified.

A simple one-time measurement of homocysteine in the blood will help to identify those at special risk who need more than the usual amount of folic acid. It has recently been found that the best way to do this test is to obtain a "methionine-load homocysteine level". The "fasting homocysteine level" that was once more commonly done has been found to be less helpful because it misses a number of people who actually do have a homocysteine problem. **If a high homocysteine level is identified, then the dosage of folic acid should be increased and the homocysteine level rechecked until it falls to a normal level.**

Certain drugs and medical conditions increase risk of low folic acid status and of unnecessary additional suffering due to depression and other health problems. For example, low folic acid levels are associated with depression, and many antidepressants work much less well if the person has poor folic acid status. Studies have shown significant improvement in depression symptoms and in the effectiveness of antidepressants when folic acid adequacy is assured. Providing appropriate levels can improve drug effectiveness, decrease side-effects and prevent complications in a number of situations. For example, antibiotics and alcohol both impair absorption of folic acid from the intestine, so more needs to be taken in to compensate. People who are chronic alcohol users or those who must take antibiotics, seizure medications or certain diabetes drugs regularly have been shown to suffer from depression and other symptoms of folic acid deficiency. A closer look at folic acid status is needed in these circumstances.

Some medications that increase folic acid requirements: Depakene, Tegretol, Dilantin, Phenobarbital, Methotrexate, Zoloft, Prozac, Metformin, chronic use of any antibiotics (Septra, Bactim, Gantrisin, Gantanol, Azulfadine, etc.)

Some medical conditions that increase folic acid requirements: Diabetes, Inflammatory Bowel Disease (Crohn's Disease), Alcoholism, AIDS, Cardio-vascular Disease, Depression, Anorexia Nervosa, Kidney Disease, Sickle Cell Disease, and Epilepsy, Hemochromatosis.

Reproductive Health

By now, the critical importance of folic acid in pregnancy is being recognized world-wide, although the research data showing this has been available since the late 1980's, with definitive studies confirming it in 1993. Unfortunately, some people still do not know that all women in childbearing years should be sure to ALWAYS obtain reliably absorbable folic acid, since the prevention of birth defects (including spina bifida, anencephaly, certain patterns of cleft lip, and likely many other conditions) relies on adequacy in the very early weeks of pregnancy when many women are unaware that conception has taken place. Waiting for a "pregnancy visit" to a health professional is too late to prevent this kind of birth defect.

Interestingly, the amount of folic acid that prevents birth defects for most people is the same amount that corrects high homocysteine levels in most people: 400 mcg/day. The amount in a prenatal vitamin is higher (800 mcg) because both mother and baby have needs and it is important that the mother not be depleted of folic acid after delivery. It seems that her little pumpkin takes up the folic acid needed from Mom's supplies and then leaves town with it. [This is called "sequestration of folate"] Many of the babies with neural tube defects were conceived within a few months of delivery of another baby, before the mother had time to replace her depleted folic acid store. To prevent this, prenatal vitamins have a generous amount of folic acid.

However, it is useful to know that just a **standard multivitamin with 400 mcg folic acid will be adequate for most people prior to conception and through early pregnancy**, so there is no need to take a "prenatal" product during this period. The extra iron and folic acid in these products are needed **later** in the pregnancy, and many women experience some difficulty with the high-iron prenatal vitamins in early pregnancy. A good solution is to just use a standard multivitamin or a children's chewable multivitamin until the pregnancy has progressed a bit and her ability to tolerate the prenatal product improves. Interestingly, when multivitamins (without the additional iron) were given prospectively to pregnant women in a large study, it was found that **those taking the vitamin actually had less nausea and vomiting** than did those who did not receive the vitamin supplement. In any case, a women struggling with nausea should not be advised to discontinue taking a vitamin "until she feels better" – she is exactly the person who needs the supplement most because her ability to eat is so compromised!

Sources of Folic Acid

Usual Adult Goal = 400 mcg daily

Pregnancy Goal = 800 mcg daily

To be called a "**Good Source**" a food should have at least 10% of the usual daily goal. In this case, 10% of 400 mcg = 40 mcg. Notice that not all foods in a food group are equally good sources of folic acid. It's just one more reason why variety within each food group is so important.

New research suggests that not all of the food forms of folate are equally well absorbed, so the absolute amount in food consumed may not be a true indicator of folate adequacy. The form used in vitamin supplements and cereal fortification ("folic acid") appears to be well absorbed, as intake of them is correlated with erythrocyte folate levels and with improved homocysteine levels in several studies. The 1998 Dietary Reference Intakes express the new Recommended Dietary Allowances for folate in dietary folate equivalents ("DFEs"), which are designed account for differences in the absorption of naturally occurring food folate and the more bioavailable synthetic folic acid (see *J Am Diet Assoc* 2000 Jan;100(1):88-94)

Folic Acid per 1/2 cup (unless noted)

100 mcg or more

Asparagus, Brussels sprouts,
Black-eyed peas, Spinach,
Soybeans, Black beans,
Broad beans,
Fortified cereals (see label)

40-90 mcg

Lima beans, Peas, Collard greens,
Sweet potato, Romaine lettuce,
Broccoli, Oranges and Orange juice,
Wheat germ, Oatmeal, Tempeh,
Miso, Peanuts (1 oz) Wild rice,
Sunflower seeds (1 oz), Beets,

Vitamin supplements and Food Fortification:

10-30 mcg

Cantaloupe, Strawberries, Pears,
Grapefruit, Grapefruit juice,
Potatoes, Corn, Carrots, Onions,
Bananas, Squash, Cabbage
Tomato, Raspberries, Cherries,

Fruits and vegetables with little or no folic acid*:

Apples and Apple juice,
Plums, Prunes, Cranberries,
Grapes and Grape juice,
Watermelon, Kiwi,
Raisins, Peaches, Apricots,

*Although these fruits have little folic acid,
they are sources of other important nutrients.

Most multivitamin pills for children and adults have 200-400 mcg folic acid. Prenatal vitamins have 800 mcg. Liquid vitamin products (such as vitamin drops for infants or liquid vitamin tonics for adults) usually have **no folic acid** because it will not stay in solution. The amount of folic acid added to grain products is 140 mcg folic acid/100 g of a food.